Exercise 4
Keynesian Cross and Fiscal Policy

1. Answer the following questions.
   - 1.1 Suppose Govt Multiplier is 5 and $\Delta G = 5$. Find ΔY.
   - 1.2 Suppose Tax Multiplier is -3 and $\Delta Y = -9$. Find ΔT.
   - 1.3 Suppose $\Delta Y = 10$ and $\Delta I = 2$. Find Investment Multiplier.

2. From $Y = C + I + G$ where $C = C_0 + C_1(Y - T)$, find
   - 2.1 Equilibrium Output Y*
   - 2.2 $\Delta Y/\Delta I$
   - 2.3 $\Delta Y/\Delta G$
   - 2.4 $\Delta Y/\Delta T$
   - 2.5 Balanced-Budget Multiplier (BBM)
   - 2.6 Explain what the BBM is.

3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

   $C = 300 + 0.75(Yd)$ $\quad\quad$ $I = 50$

   $G = 50$ $\quad\quad$ $T = 50$ (lump-sum tax)

   - 3.1 Use the Y = AE (standard) approach to find the equilibrium output.
   - 3.2 Draw the Keynesian Cross, and find the intercept on the vertical axis and the slope of the AE schedule.
   - 3.3 Use the Leakage = Injection (or saving/investment) approach to find the equilibrium level of output.
     (Hint: the equilibrium condition is $S + T = I + G$, with $Yd = Y - T = C + S$)
   - 3.4 Draw the saving/investment curve to show the equilibrium.
   - 3.5 Suppose that the government decides to build more roads, raising government spending by 50 units, but this project is to be financed by the increase in net taxes of 50 units. Use the Y = AE (standard) approach to find the new equilibrium output.
   - 3.6 Use the Balanced-Budget Multiplier (BBM) derived from Question 2.5 to find the new equilibrium output.

4. From $Y = C + I + G + (X - M)$
where $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$, find

4.1 Equilibrium Output Y*

4.2 $\Delta Y/\Delta I$

4.3 $\Delta Y/\Delta G$

4.4 $\Delta Y/\Delta T$

4.5 Balanced-Budget Multiplier (BBM)

5. Assume an open economy with government. The country has the following components of aggregate expenditure.

$C = 200 + 0.7(Yd)$ $I = 75$ $G = 75$

$T = 50$ $X = 50$ $M = 50 + 0.1Y$

5.1 Use the Y = AE approach to find the equilibrium. Is Y = 300 an equilibrium? If it is not, explain the adjustment process towards equilibrium.

5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

5.3 Interpret the value of each of the multipliers.

Suppose that the full-employment output (Y_F) is 600;

5.4 What type of output gap is the economy currently experiencing?

5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

Now, government wants to correct the output gap by moving the economy to the full-employment level, and is considering different policies.
(Hint: use the multipliers from Question 5.2 to answer the following questions)

5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

6. Explain the role of Import as an automatic stabilizer. If the government wants to further stabilize the economy, is there anything that the government can do with its tax system? Explain.

7. Let S = -200 + 0.5Y and I = 50, be the saving function and investment.

7.1 Use the saving/investment approach to find the equilibrium output.

7.2 Find the equilibrium saving. (Hint: substitute Y* into S)

Suppose people decide to save more, increasing autonomous saving by 100.

7.3 Use the saving/investment approach to find the new equilibrium output.

7.4 Find the new equilibrium saving. (Hint: substitute new Y* into S)

7.5 Comment on your result.

1. Answer the following questions.

1.1 Suppose Govt Multiplier is 5 and $\Delta G = 5$. Find ΔY.

1.2 Suppose Tax Multiplier is -3 and $\Delta Y = -9$. Find ΔT.

1.3 Suppose $\Delta Y = 10$ and $\Delta I = 2$. Find Investment Multiplier.

1.1 $\frac{\Delta Y}{\Delta G} = 5$

$\frac{\Delta Y}{5} = 5$

$\Delta Y = 25$ #

1.2 $\frac{\Delta Y}{\Delta T} = -3$

$\frac{-9}{\Delta T} = -3$

$\Delta T = 3$ #

1.3 Investment multiplier $\frac{\Delta Y}{\Delta I}$

$\frac{10}{2} = 5$ #

$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - MPC}$

2. From $Y = C + I + G$ where $C = C_0 + C_1(Y - T)$, find

2.1 Equilibrium Output Y*

2.2 $\Delta Y/\Delta I$

2.3 $\Delta Y/\Delta G$

2.4 $\Delta Y/\Delta T$

2.5 Balanced-Budget Multiplier (BBM)

2.6 Explain what the BBM is.

2.1 $Y = C_0 + C_1 Y - C_1 T + I + G$

$Y - C_1 Y = C_0 - C_1 T + I + G$

$(1 - C_1) Y = C_0 - C_1 T + I + G$

$Y = \frac{C_0 - C_1 T + I + G}{1 - C_1}$ #

2.2) $AE = C + I + G$

$= C_0 + C_1(Y - T) + I + G$

$= C_0 + C_1 Y - C_1 T + I + G$

$= \frac{1}{1 - C_1}$ #

2.3) $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of } AE}$

$AE = C_0 + C_1 Y - C_1 T + I + G$

$\frac{1}{1 - C_1}$ #

2.4) $\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope of } AE}$

$AE = C_0 + C_1(Y-T) + I + G$

$= \frac{-(Y-T)}{1 - C_1}$ # $\frac{-MPC}{1 - C_1}$

w/ y mov

2.5) BBM

$\frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = \frac{1 - C_1}{1 - C_1}$

when plus gov multiplier and tax multiplier

2.6 BBM is a change in aggregate output when both G and T increase by 1 unit

3. Assume a closed economy with government. The country has the following components of aggregate expenditure.

C = 300 + 0.75(Yd) I = 50

G = 50 T = 50 (lump-sum tax)

3.1 Use the Y = AE (standard) approach to find the equilibrium output.

3.2 Draw the Keynesian Cross, and find the intercept on the vertical axis and the slope of the AE schedule.

3.3 Use the Leakage = Injection (or saving/investment) approach to find the equilibrium level of output.
(Hint: the equilibrium condition is S + T = I + G, with Yd= Y – T = C + S)

3.4 Draw the saving/investment curve to show the equilibrium.

3.5 Suppose that the government decides to build more roads, raising government spending by 50 units, but this project is to be financed by the increase in net taxes of 50 units. Use the Y = AE (standard) approach to find the new equilibrium output.

3.6 Use the Balanced-Budget Multiplier (BBM) derived from Question 2.5 to find the new equilibrium output.

$-300 - 0.25(Y -$

3.1) $AE = C + I + G$

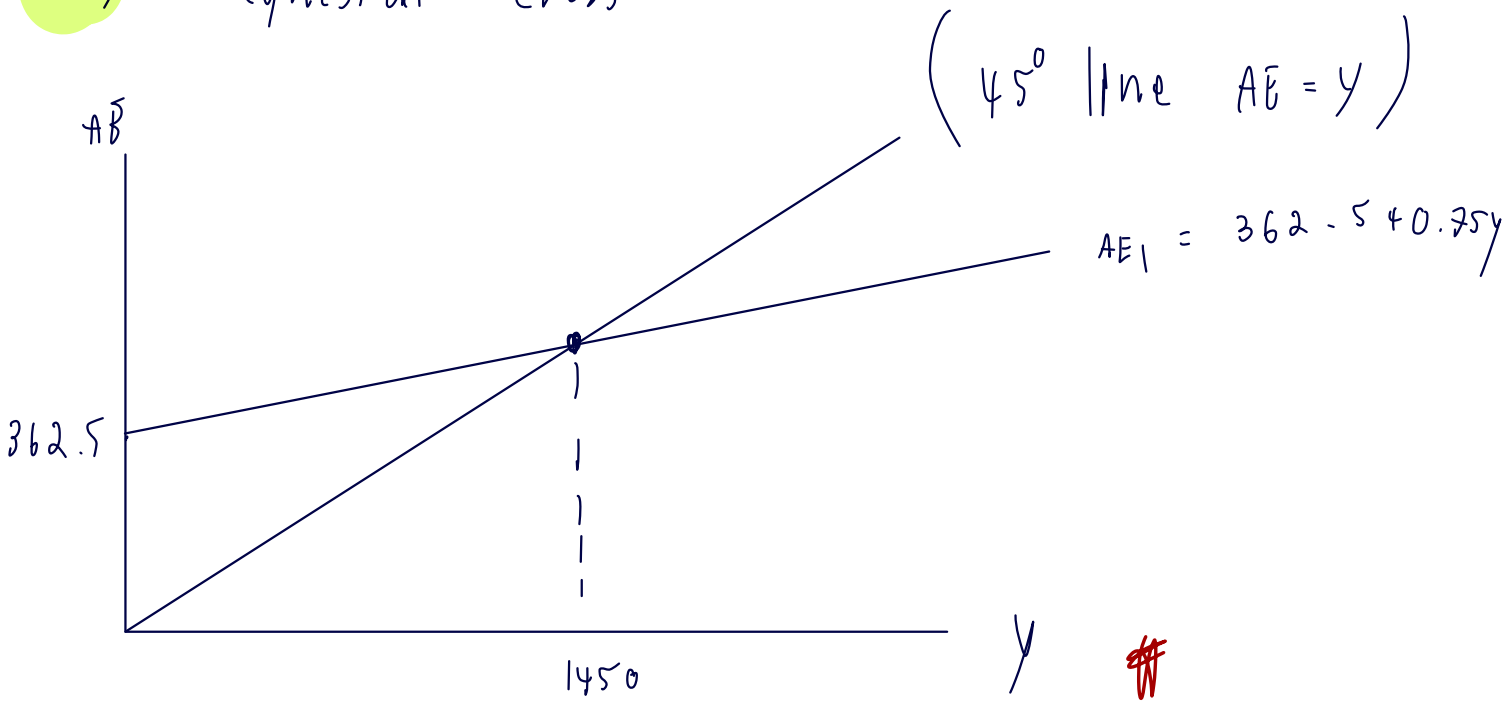
$Y = 300 + 0.75(Y - 50) + 50 + 50$

$Y = 300 + 0.75Y - 37.5 + 100$ $AE = 362.5 + 0.75Y$

$0.25Y = 362.5$

$Y^* = 1450$ #

3.2) Keynesian Cross



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3.3) $S+T=I+G$

$S+T=I+G$ (leakage = injection)

Leakage = Injection $(S=I)$

$y-T=C+S$ saving function

$S = -a + (1-MPC)\,y$

$S = -262.5 + 0.25y$

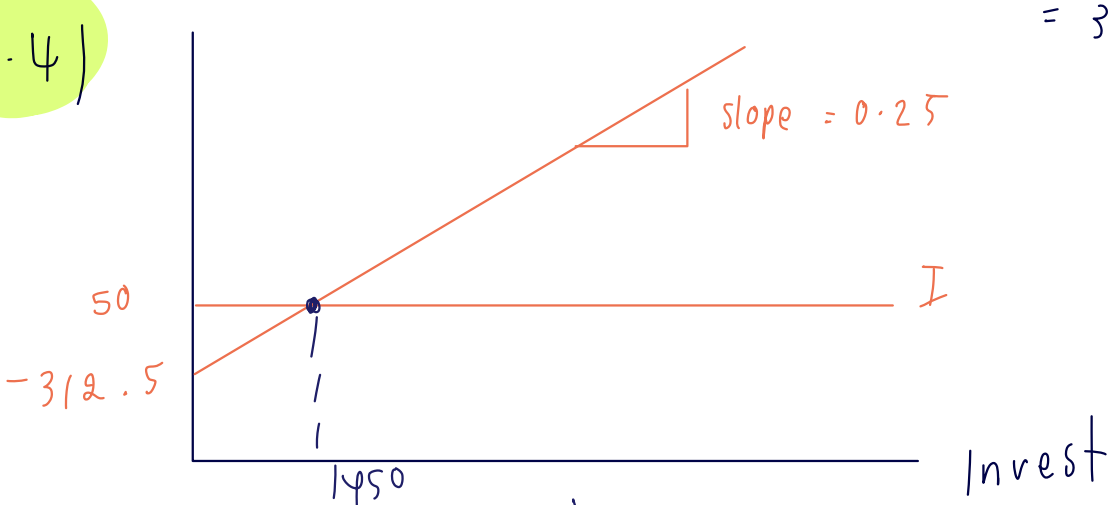
$-262.5 + 0.25y = 100$

$0.25y = 362.5$

$y^* = 1450$

3.4)

saving & I



saving function

$C = 300 + 0.75(y-50)$

$= 300 + 0.75y - 37.5$

$262.5 + 0.75y$

$Y_d = C+S$

$y-T = C+S$ — saving fn

$y-50 = 300 + 0.75(y-50) + 5$

$S = -300 - 0.75y + 37.5 + y - 50$

$S = -312.5 + 0.25y$

3.5)

C = 300 + 0.75(Yd) I = 50

G = 50 T = 50 (lump-sum tax)

new $G = 100$ $T = 100$

$AE = C + I + G$

$Y = 300 + 0.75(Y - 100) + 100 + 50$

$Y = 300 + 0.75Y - 75 + 150$

$.25Y = 375$

$Y^* = 1500$

BBM : Tax & Gov increase by the same rate

3.6)

$$\frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = \frac{50}{50} + \frac{50}{50} = 2$$

when G & T ↑ 1 Y^* ↑ 2

Y^* ↑ 100

G & T ↑ 50

= old Y^* + 50

= 1450 + 50

= 1500

4. From $Y = C + I + G + (X - M)$
where $C = C_0 + C_1(Y - T)$ and $M = M_0 + M_1(Y)$, find

4.1 Equilibrium Output Y*

4.2 $\Delta Y/\Delta I$

4.3 $\Delta Y/\Delta G$

4.4 $\Delta Y/\Delta T$

4.5 Balanced-Budget Multiplier (BBM)

autonomous import

4.1

$$AE = C + I + G + X - M$$

$$Y = C_0 + C_1 Y - C_1 T + I + G + X - M_0 - M_1 Y$$

$$Y - C_1 Y + M_1 Y = C_0 - C_1 T + I + G + X - M_0$$

$$(1 - C + M) Y = C_0 - C_1 T + I + G + X - M_0$$

$$Y = \frac{C_0 - C_1 T + I + G + X - M_0}{1 - C + M}$$

4.2

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - MPC}$$

$$AE = C_0 + C_1 Y - C_1 T + I + G + X - M_0 - M_1 Y$$

$$= \frac{1}{1 - (C_1 - M)}$$

4.3

$$\frac{\Delta Y}{\Delta G} = \frac{1}{1 - \text{slope of } AE}$$

$$= \frac{1}{1 - (C_1 - M)}$$

4.4

$$\frac{\Delta Y}{\Delta T} = \frac{-MPC}{1 - \text{slope of } AE}$$

$$= \frac{-C + M}{1 - (C_1 - M)}$$

5. Assume an open economy with government. The country has the following components of aggregate expenditure.

C = 200 + 0.7(Yd) I = 75 G = 75

T = 50 X = 50 M = 50 + 0.1Y

5.1 Use the Y = AE approach to find the equilibrium. Is Y = 300 an equilibrium? If it is not, explain the adjustment process towards equilibrium.

5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

5.3 Interpret the value of each of the multipliers.

Suppose that the full-employment output (Y_F) is 600;

5.4 What type of output gap is the economy currently experiencing?

5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

Now, government wants to correct the output gap by moving the economy to the full-employment level, and is considering different policies.

(Hint: use the multipliers from Question 5.2 to answer the following questions)

5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

5.1)

$AE = C + I + G + X - M$

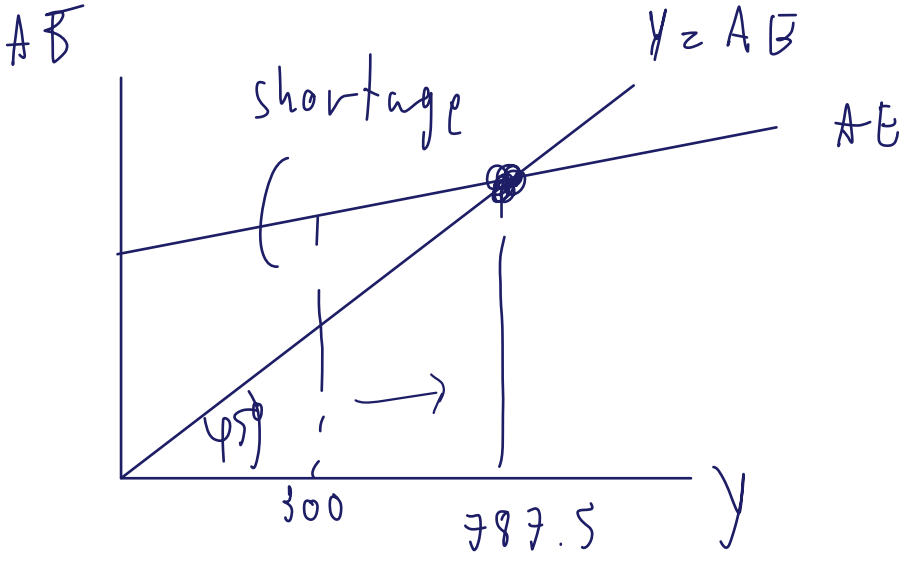
$y = 200 + 0.7(y - 50) + 75 + 75 + 50 - 50 - 0.1y$

$y = 200 + 0.7y - 35 + 75 + 75 + 50 - 50 - 0.1y$

$0.4y = 315$

$y^* = 787.5$ #

In this case, at $y = 300$ $y < C + I$, which mean aggregate output. To clarify, the inventories decline, encourage firm increase in production to move to equilibrium at $y = 787.5$ #



5.2

5.2 Based on what you have derived in Question 4, calculate the investment, government spending, tax, and balanced-budget multipliers.

1st find investment

$AE = C + I + G + X - M$

$C = 200 + 0.7(Yd)$

$M = 50 + 0.1Y$

$AE = C + I + G + X - M$

$AE = 200 + 0.7Y + 75 + 75 + 75 + 50 - 50 + 0.1Y$

$AE = 0.6Y + 75$

$\frac{\Delta Y^*}{\Delta I} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5$ #

$\frac{\Delta Y^*}{\Delta T} = \frac{-C}{1 - C_1 + M_1} = \frac{-0.7}{1 - 0.7 + 0.1} = \frac{-0.7}{1 - 0.7 + 0.1} = -1.75$ #

$\frac{\Delta Y^*}{\Delta G} = \frac{1}{1 - C_1 + M_1} = \frac{1}{1 - 0.7 + 0.1} = 2.5$ #

$BBM = \frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 2.5 - 1.75 = 0.75$ #

5.3 Interpret the value of each of the multipliers. Suppose that the full-employment output (Y_F) is 600;

$\frac{\Delta Y^*}{\Delta I}$: when investment increase by 1 unit, output will increase by 2.5

$\frac{\Delta Y^*}{\Delta G}$: when government spending increase by 1 unit, output will increase by 2.5

$\frac{\Delta Y^*}{\Delta T}$: when tax increase by 1 unit, output will decrease by 1.75 units

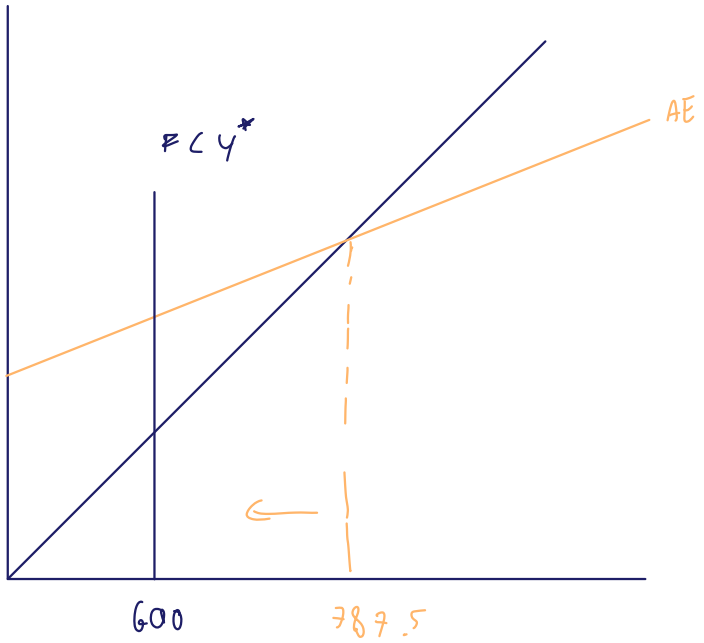
BBM : when government and tax are increased equality by 1 unit output will increase by 0.75

Suppose that the full-employment output (Y_F) is 600;

5.4 What type of output gap is the economy currently experiencing?

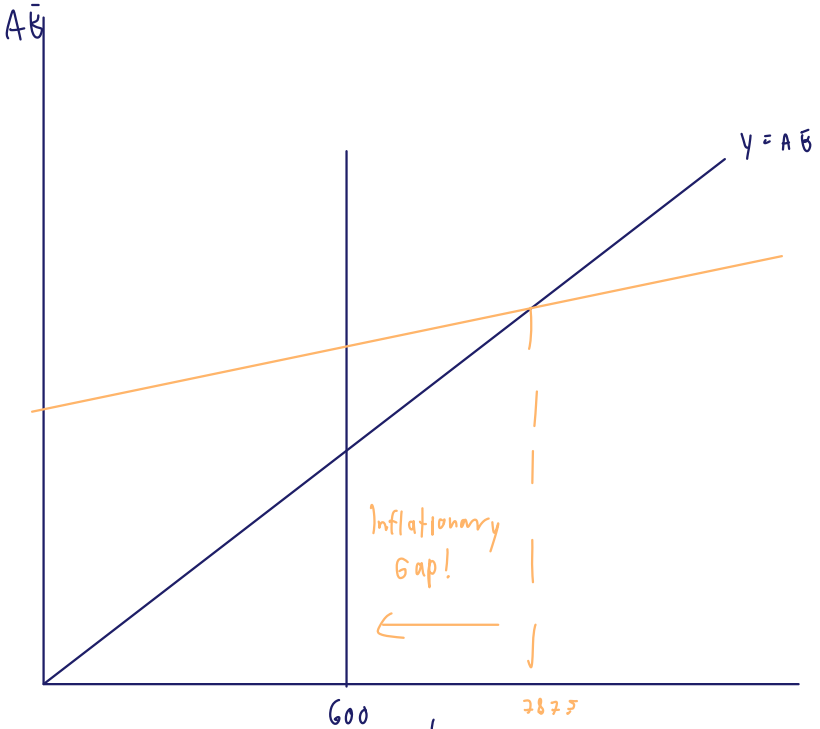
5.5 Draw the Keynesian Cross. Identify its slope and intercept. Also, illustrate the output gap.

5.4



Unemployment rate is below the natural rate of employment, which mean we are in inflationary gap. In this time, the economy is growing too fast and over employed. So that, the policy solution is the raise tax and cut government spending to be $Y = Y_F$.

5.5



$AE = C + I + G + X - M$

$= 0.6Y + 315$

Slope = 0.6

↳ MPC = MPM

↳ output gap = 187.5

Now, government wants to correct the output gap by moving the economy to the full-employment level, and is considering different policies.
(Hint: use the multipliers from Question 5.2 to answer the following questions)

5.6 If the government wants to adjust **only its spending (G)**, how much G should be changed?

5.7 If the government wants to adjust **only its net taxes (T)**, how much T should be changed?

5.8 If the government wants to boost **only investment (I)**, how much I should be changed?

5.9 If the government wants to implement a balanced-budget policy, what should the government do with G and T?

5.6 $\frac{\Delta Y^*}{\Delta G} = 2.5$

$\Delta G = \frac{-187.5}{2.5} = -75$ #

5.7 $\frac{\Delta Y^*}{\Delta T} = -1.75$

$\Delta T = \frac{-187.5}{-1.75} = 107.14$ #

5.8 $\frac{\Delta Y^*}{\Delta I} = 2.5$

$\Delta I = \frac{-187.5}{2.5} = -75$ #

5.9 $\frac{\Delta Y^*}{\Delta G} + \frac{\Delta Y^*}{\Delta T} = 0.75$

$\frac{-187.5}{0.75} = -250$ #

6. Explain the role of Import as an automatic stabilizer. If the government wants to further stabilize the economy, is there anything that the government can do with its tax system? Explain.

when economy is bad, output is low, So Tax and import are small automatically. Therefore, people have more income to spend, which help boost the economy in the bad times.

7. Let S = -200 + 0.5Y and I = 50, be the saving function and investment.

7.1 Use the saving/investment approach to find the equilibrium output.

7.2 Find the equilibrium saving. (Hint: substitute Y* into S)

Suppose people decide to save more, increasing autonomous saving by 100.

7.3 Use the saving/investment approach to find the new equilibrium output.

7.4 Find the new equilibrium saving. (Hint: substitute new Y* into S)

7.5 Comment on your result.

7.1) $S = I$

$-200 + 0.5Y = 50$

$0.5Y = 250$

$Y^* = 500$

7.2) saving $= -200 + 0.5Y^*$

$= -200 + 0.5(500)$

$= -200 + 250$

$S^* = 50$

7.3) People save more money by 100

So, Saving + 100 = new saving

New saving $= -200 + 0.5Y + 100$

$= -100 + 0.5Y$

Due to $S = I$

$-100 + 0.5Y = 50$

$\frac{1}{2}Y = 150$

$Y^* = 300$

7.4) new Equilibrium of saving

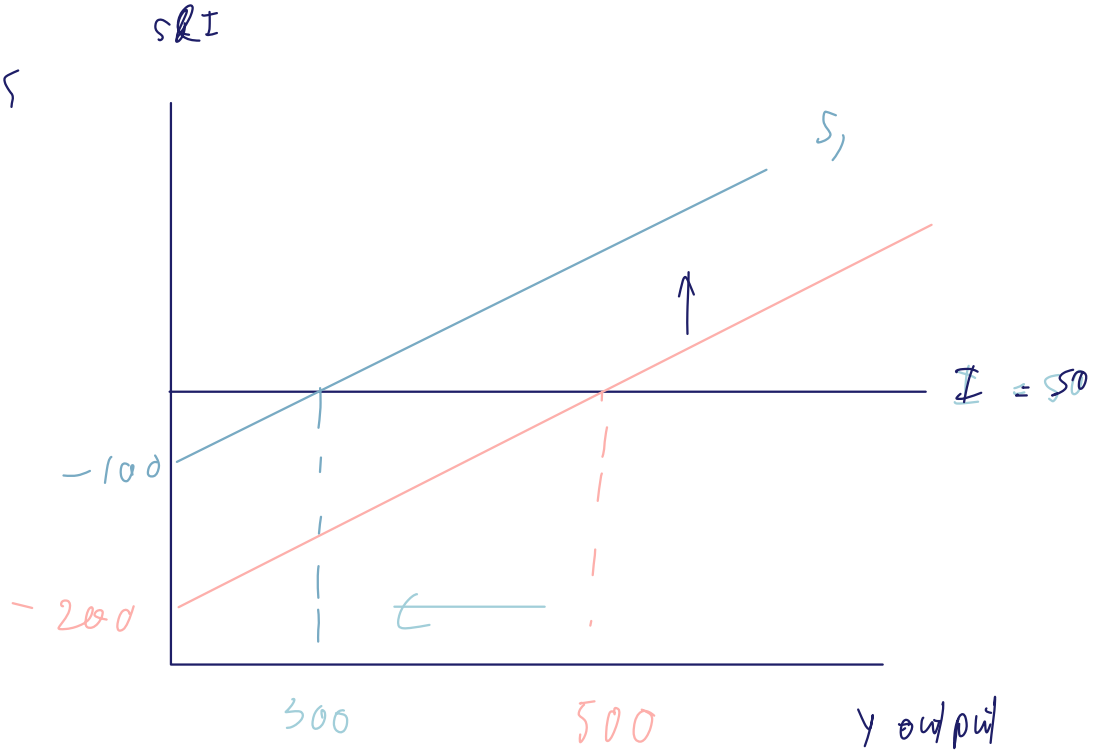
saving = $-100 + 0.5y^*$

$= -100 + 0.5(300)$

$= -100 + 150$

$S^* = 50$

7.5



Paradox of thift : Ppl save more → Economy slow down → Less income to ppl (Y_d)

people save more by 100 ($S_0 \rightarrow S_1$)